

# A Comparative Analysis of Subsidy Reforms in the Middle East and North Africa Region

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**WORLD BANK GROUP**

Poverty and Equity Global Practice Group

July 2016

## Abstract

The paper compares the distribution of energy and food subsidies across households and the impact of subsidy reforms on household welfare in the Middle East and North Africa region. The analysis uses a unified model and harmonized household data. The results show that the distribution of subsidies and the welfare effects of subsidy reforms are quite diverse across countries and products. Energy subsidies tend to be pro-rich in terms of absolute amounts, but tend to be more important for the poor in terms of expenditure shares.

Instead, food subsidies are larger for the poor in absolute and relative terms. These findings do not apply everywhere, and the scale of these phenomena are different across countries and products. The welfare effect of a 30 percent reduction in subsidies can be important, especially considering the cumulated effect across products, but the cost of compensating the loss in welfare for the poor is generally low compared with the budget benefits of decreasing subsidies.

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# A Comparative Analysis of Subsidy Reforms in the Middle East and North Africa Region

*Abdelkrim Araar and Paolo Verme*

**JEL:** H2, H7, N7, O13, Q1, Q4

**Keywords:** North Africa, Middle East, Energy Subsidies, Food Subsidies.

## Introduction

Consumer subsidies in the Middle East and North Africa (MENA) region are widespread. All of the countries in the region administer energy subsidies, and most countries administer food subsidies on at least a few items. These subsidies are important for households in that they constitute a sizable part of household expenditure and represent an important share of governments' expenditure or forgone revenues. Consumer subsidies are also larger in this part of the world compared to other regions (Clements *et al.* 2013; Sdravovich *et al.* 2014) and they are more heterogeneous in many respects. The initial origins, types, profile, administration, and cost and beneficiaries of subsidies vary significantly across the countries of the MENA region. This heterogeneity makes comparisons across countries more complex, but also provides an opportunity to derive lessons on subsidies and subsidy reforms.

This paper aims at comparing the distribution of subsidies and the impact of subsidy reforms on welfare across countries in the MENA region. Specifically, the paper does this offering a standardized analysis of consumer subsidies in 2014. We use household budget survey data for five selected case studies and standardize the key variables for the analysis, including expenditure per capita on individual products and a basic set of household characteristics. We also update all surveys to 2014 using information on production, prices, and population growth and transform all values in purchasing power parity (PPP) using the latest round of the PPP survey (2011). We then use a version of the microsimulation model "SUBSIM," ([www.subsim.org](http://www.subsim.org)) which is designed to make comparisons across countries, to provide a comparative distributional analysis of subsidies and simulations of subsidy reforms. This version of the software is designed to compare individual products across countries and allows researchers to see how any two countries compare in the distribution of subsidies and in the outcomes of subsidy reforms. In this way, we are able to simulate the same subsidy reforms in different countries and compare the outcomes across countries in terms of household welfare and government revenues.

The countries considered are Libya, Morocco, and Tunisia for North Africa and Djibouti and the Islamic Republic of Iran for the Middle East. The combined populations of these countries is 130 million or about 34 percent of the population of the MENA region. The sample includes net oil exporters such as the Islamic Republic of Iran and Libya and net oil importers such as Morocco

and Tunisia. It also includes low-income countries (Djibouti), low-middle-income countries (Morocco and Tunisia), and middle-income countries such as the Islamic Republic of Iran.

The products we consider are those that are the most relevant in terms of subsidies and those that are most frequently subsidized in the countries considered. These products are gasoline, diesel, liquefied petroleum gas (LPG), and electricity for energy products, and flour, bread, sugar, and vegetable oil for food products. The comparison of energy products could be done across all countries considered while the comparison of food products was possible only for selected countries. That is because for some countries like Tunisia it was not possible to gather all the necessary information while in other countries such as Djibouti some of the four food products considered were not subsidized.

The focus of the analysis is on direct effects only, as it was not possible to collect and standardize a sufficient number of input-output matrixes for a comparative analysis of indirect effects. The relative importance of indirect effects changes across products and income groups. It is high for products like gasoline and for richer quintiles and small for products like bread and for poorer quintiles. Therefore, results on welfare related to reforms on food products capture the greatest share of the total effect, but results on overall welfare related to energy products miss on an important share of the total impact of subsidy reforms.

Results show that the distribution and effects of subsidies are quite diverse across countries and products. Energy subsidies tend to be pro-rich in terms of absolute amounts (larger amounts accrue to richer households) but tend to be more important for the poor in terms of expenditure shares. Instead, food subsidies can be larger for the poor in absolute and relative terms. These findings do not apply everywhere, and the scale of these phenomena are different across countries and products. The welfare effect of a 30 percent reduction in subsidies can be important, especially if we consider the cumulated effect across products, but the cost of compensating the loss in welfare for the poor is generally low as compared to the budget benefits of the reform. This leaves governments with some fiscal space for compensation of other groups such as the middle class.

The paper is organized as follows. The next section illustrates the data and methods used for the analysis. The paper then provides a comparative distributional analysis of subsidies and simulates subsidy reforms comparing the outcomes across countries.

## Data and Analytical Approach

In the following sections, we describe the microdata used for the analysis and the baseline prices (subsidized products and unit subsidies) as of 2014, our baseline year. The updates were made using published IMF macroindicators for inflation and gross domestic product (GDP) per capita as well as population statistics (see Tables B.1 and B.2). The exercise that follows estimates the distribution of subsidies and provides new simulations of subsidy reforms using the primary data files for each country and transforming expenditure into U.S. dollars (\$) at purchasing power parity (PPP). This allows comparing subsidies and the outcome of subsidy reforms using a common currency.

### Microdata

Table 1 shows the population statistics estimated directly from the surveys. These numbers are not identical to all country-specific population estimates, but they are very close. We can see that the sample of countries considered amounts to a total population of almost 130 million people, approximately 34 percent of the population in the MENA region in 2014. The total household expenditure for the countries considered is approximately \$0.63 trillion-PPP per year, which amounts to \$3,913-PPP per capita, per year, and \$17,381-PPP per household, per year. This average hides differences across countries. The Islamic Republic of Iran is by far the country with the highest per capita expenditure (\$7,477-PPP). Morocco, and Tunisia follow with approximately \$4,000-PPP, and Libya and Djibouti come last with approximately \$2,000-PPP. The sample of countries we have is representative of three groups of countries at different levels of economic development. We also have oil-producing countries and net exporters of oil, such as the Islamic Republic of Iran and Libya; non-oil-producing countries with some natural resources, such as Morocco; and non-oil-producing countries, such as Tunisia, which have little in the way of natural resources. Therefore, we have a certain diversity also in terms of natural endowments.

Table 1: Baseline Population and Expenditure Statistics, in US\$ at PPP

Country	Population	Number of households	Total expenditures	Per capita expenditures	Household expenditures
Djibouti	939,000	166,966	1,856,869,376	1,977	11,121
Iran, Islamic Rep.	77,969,000	21,909 116	582,976,929,792	7,477	26,609
Libya	6,213,000	991,549	1, 318,968,832	1,983	12,424
Morocco	33,179,000	7,070,798	138,34, 810,176	4,170	19,565
Tunisia	11,060,000	2,548,655	43,800,788,992	3,960	17,186
Total	129,360,000	10,777,968	628,634,588,160	3,913	17,381

*Source:* World Bank estimations from Household Budget Surveys.

*Note:* PPP = purchasing power parity. Data on household expenditure per capita can be very different from data on GDP per capita and the cross-country ranking made according to these two criteria can be quite different. This is mostly explained by the fact that total household expenditure represents different shares of GDP across countries.

### Baseline Prices and Subsidies

As a reference period for the analysis, we use the very early part of 2014 when oil prices and subsidies peaked at their highest levels. A major wave of subsidy reforms occurred in the MENA region in 2014 but this paper focuses on the extraordinary situation faced by MENA countries before the reforms. We are interested in the prices and subsidies existing in the MENA countries just before the reforms.

Table 2 shows the baseline prices and unit subsidies for energy products. For LPG, prices are the lowest for Libya and the Islamic Republic of Iran in that order and the highest for Djibouti. The highest shares of subsidies as a percentage of the free market price are in Libya and the Islamic Republic of Iran, the two oil-producing countries, with Libya's LPG subsidies reaching 90.4 percent of the full price. The percentage price increases that would be necessary to eliminate subsidies on LPG are remarkable. In Libya the price would have to be increased by 947 percent to eliminate subsidies and in the Islamic Republic of Iran by 500 percent.

It is interesting to see that in Djibouti, the poorest of the countries considered, the price of LPG is 15 times the price in the Islamic Republic of Iran, the richest country considered. This divergence is also striking because LPG is a product that is typically consumed by the poor and it

is the most important among the poor. The claim that consumers' subsidies are a form of social protection schemes does not really hold if we observe data for LPG across countries.

Prices for electricity appear less diverse, but that can be explained by the way the prices are listed—in kilowatt hours (average across tariffs blocks). As a percentage of the free market price, electricity subsidies are the highest in Tunisia. The lowest subsidies are for Libya (30.6 percent) and Morocco (42.3 percent) but still high. To reach the market price, Libya would have to increase prices by 44 percent, an increase that would not go unnoticed by the population, and Tunisia would have to increase prices by 583 percent, a staggering figure.

Prices for gasoline and diesel are closer to the free market price for most countries except the Islamic Republic of Iran and Libya. The Islamic Republic of Iran and Libya in particular would have to raise prices of gasoline fivefold and more than sevenfold, respectively, to reach the free market price. For the Islamic Republic of Iran in 2014 this finding is remarkable given that this country went through a comprehensive reform of the subsidies system in 2010 that supposedly eliminated most subsidies and was costly in terms of cash transfers administered to the population in compensation of the removal of subsidies.

Table 2: Energy Unit Prices and Subsidies, in US\$ at PPP (2014)

	Price	Subs.	Subs. (%)	Increase (%)	Price	Subs.	Subs. (%)	Increase (%)
	<i>LPG (13 kg)</i>				<i>Electricity (kWh, av.)</i>			
Djibouti	28.3	2.8	9.1	10				
Iran, Islamic Rep.	1.9	9.7	83.3	500	0.18	0.25	58.5	140.7
Libya	2.9	27.4	90.4	947	0.26	0.11	30.6	44
Morocco	10.4	20.7	66.6	199.8	0.21	0.15	42.3	73.2
Tunisia	9.8	20.9	68	212.7	0.11	0.63	85.4	583
	<i>Gasoline (L)</i>				<i>Diesel (L)</i>			
Djibouti	3	-0.1	-2		2.1	0.3	11.1	12.5
Iran, Islamic Rep.	0.5	2.3	83.3	500	0.4	2.3	84.8	557.1
Libya	0.2	1.6	87.7	714.7	0.2	1.6	88.1	740
Morocco	3.1	0	0		2.4	0.2	7.5	8.1
Tunisia	2.5	0.2	9.1	10	2.1	0.4	17.4	21.1

Source: World Bank estimations from Household Budget Surveys.

Note: PPP = purchasing power parity.

For food (Table 3), the items considered are few, but we can see that subsidies can also be quite high. For flour, subsidies represent 91.3 percent of the free market price in Libya and almost 60 percent in the Islamic Republic of Iran. Libya has also the highest subsidies for bread, sugar, and vegetable oil, and the Islamic Republic of Iran has large subsidies on bread. Therefore, the oil-producing countries seem to be those that maintained the highest food subsidies. However, subsidies are also high in Morocco for flour and sugar, and in this country these products are universally subsidized and not subject to quotas.

Table 3: Food Unit Prices and Subsidies, in US\$ at PPP (2014)

	Price	Subs.	Subs. (%)	Increase (%)	Price	Subs.	Subs. (%)	Increase (%)
	<i>Flour (kg)</i>				<i>Bread (kg)</i>			
Djibouti	0.759	0.053	6.5	7.0	n.a.	n.a.	n.a.	n.a.
Iran, Islamic Rep.	0.689	1.027	59.9	149.2	1.199	1.346	52.9	112.2
Libya	0.130	1.360	91.3	1,044.4	0.054	1.334	96.1	2,491.9
Morocco					n.a.	n.a.	n.a.	n.a.
	<i>Flour1</i>	1.197	0.168	12.3	14.0 %			
	<i>Flour2</i>	0.479	0.342	41.7	71.5 %			
	<i>Sugar (kg)</i>				<i>Vegetable oil (liter)</i>			
Djibouti	0.865	0.061	6.5	7.0	1.422	0.171	10.7	12.0
Iran, Islamic Rep.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Libya	0.362	1.545	81.0	427.2	0.868	4.054	82.4	467.0
Morocco					n.a.	n.a.	n.a.	n.a.
	<i>Sugar1</i>	1.393	0.682	32.9	49.0			
	<i>Sugar2</i>	1.393	0.682	32.9	49.0			
	<i>Sugar3</i>	1.077	0.682	38.8	63.3			

*Source:* World Bank estimations from Household Budget Surveys. *Note:* Subsidized flour and sugar in Morocco have different prices depending on varieties and forms; kg = kilogram; PPP = purchasing power parity.

### A Distributional Analysis of Subsidies

As indicated in the introduction, we use the microsimulation model SUBSIM to provide a distributional analysis of subsidies and simulations of alternative subsidy reforms. The publicly available version of SUBSIM comes in two flavors, SUBSIM direct, which estimates direct effects using Household Budget Survey (HBS) data only, and SUBSIM indirect, which uses HBS data and input-output matrixes to estimate direct and indirect effects.

This paper uses a third version of SUBSIM, which is not yet publicly available and which is designed to provide comparative analyses of subsidies across countries. This version is similar to

the SUBSIM direct version in that it automatically provides a set of results in Excel tables and graphs that can be readily used for analysis. The difference is that this version provides results for individual products across countries instead of results for individual countries across products. As part of the distributional analysis, we look first at the importance of subsidies and subsidized products for households. We then determine who are the main beneficiaries of subsidies, as well as the potential dilemmas for reforming subsidies.

When we talk about the importance of subsidized products, we should distinguish between *absolute* and *relative* importance. For absolute importance, we refer to the monetary values of subsidies or subsidized products in USD at PPP values. For relative importance, we refer to subsidies or subsidized products as a share of total household expenditure.

### The Absolute Importance and Distribution of Subsidies

Table 4 compares the per capita expenditure of the four main energy and food products considered across countries in US\$-PPP values. Looking at energy products and on average, households spend \$19.7 per capita, per year on LPG, \$85.5 on electricity, \$54.2 on gasoline, and \$9.5 on diesel. These amounts vary widely across countries. For example, Moroccans spend (in PPP values) the largest amount on LPG, electricity, and diesel. Libya has the lowest expenditure for electricity and one of the lowest for gasoline and diesel. As expected, because Libya has high subsidies and Morocco has low subsidies, it is clear that expenditures for crude oil products are partly driven by the level of subsidies. But other factors must be considered, including the desirability of these products and the exchange rate used in PPP values.

Subsidies on food are much less widespread in terms of countries and products. Libya has the largest variety of food subsidies, and a few other countries subsidize flour, bread, sugar, or vegetable oil, which are the four products that we analyze across countries. The largest subsidies go to flour and bread. The distinction between flour and bread is not always clear cut in the data. Some countries subsidize the price of flour for mills and then impose regulated prices on the sale of bread. What we observe in expenditure data are direct purchases of flour or bread on the part of households. Therefore, we need to estimate the flour subsidies received by households via the purchase of bread using conversion factors between these two products. As a consequence, the estimates on bread and flour should be taken with some caution. Sugar is also an important subsidized item in three countries, and vegetable oil remains subsidized in two countries.

Table 4 Per Capita Expenditure on Subsidized Products, in US\$ at PPP/year

	Energy				Food			
	LPG	Electricity	Gasoline	Diesel	Flour	Bread	Sugar	Vegetable oil
Djibouti	1.8	95.1	36.9	n.a.	35.8	n.a.	51	29.2
Iran, Islamic Rep	10.6	83	102.8	0.6	12.6	163.7	n.a.	n.a.
Libya	4.4	26.4	26.8	0.5	9	30.1	17.9	46.6
Morocco	42.6	114.9	19.9	26.6	56.7	n.a.	26.8	n.a.
Tunisia	38.9	108.1	84.7	10.3	n.a.	n.a.	n.a.	n.a.
Average across countries	19.66	85.5	54.22	9.5	28.525	96.9	31.9	37.9

*Source:* World Bank estimations from Household Budget Surveys.

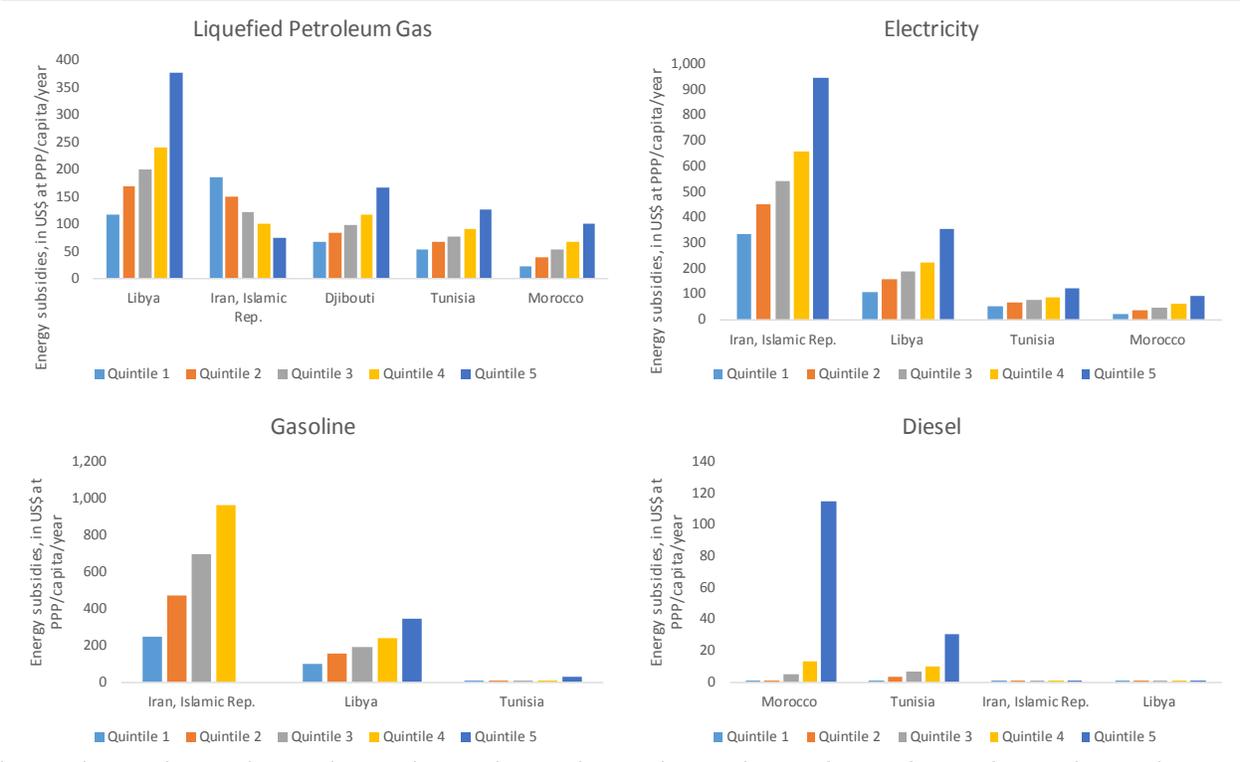
The results on the distribution of subsidies across quintiles are very different depending on the product and the country (Figure 1). Consider LPG first. In one country, the Islamic Republic of Iran, subsidies on LPG are progressive, meaning that poorer households get the largest dollar amounts of subsidies. But for all the other countries, subsidies on LPG are clearly regressive, as richer households get the largest amounts. Subsidies for LPG vary between a few dollars for the poorest quintile in Morocco to almost \$400 for the rich in Libya. These amounts are significant, particularly for the poorest countries. However, we should not take for granted that subsidies on LPG are always pro-rich, as shown for the Islamic Republic of Iran.

Electricity subsidies are the most important in dollar amounts and exceptionally important in the Islamic Republic of Iran, where subsidies can reach up to \$1,000-PPP per capita, per year for the richest quintile. Subsidies are less important in other countries but still nonnegligible, varying between a few dollars and more than \$300-PPP per capita, per year. In the case of electricity, subsidies invariably favor the rich in absolute terms, as the largest amounts in dollar equivalents are taken up by the richest quintiles with no exceptions across countries. Clearly, oil-producing countries are those that offer the largest subsidies via electricity, probably because the need to produce electricity with cheaper fuels is less of a priority.

Also in the case of gasoline and diesel, subsidies are invariably pro-rich, with the largest dollar amounts taken up by the richest. The dollar amounts of these two products are relevant only in a few countries - the Islamic Republic of Iran and Libya for gasoline - that are either oil producers or endowed with natural resources. In these countries and for these products, it is evident that the

dollar amounts across the distribution increase quickly as we move toward richer households, showing that the regressivity of these subsidies is steep and consistent across countries. Diesel is important only in Morocco and in Tunisia and only for the top quintile.

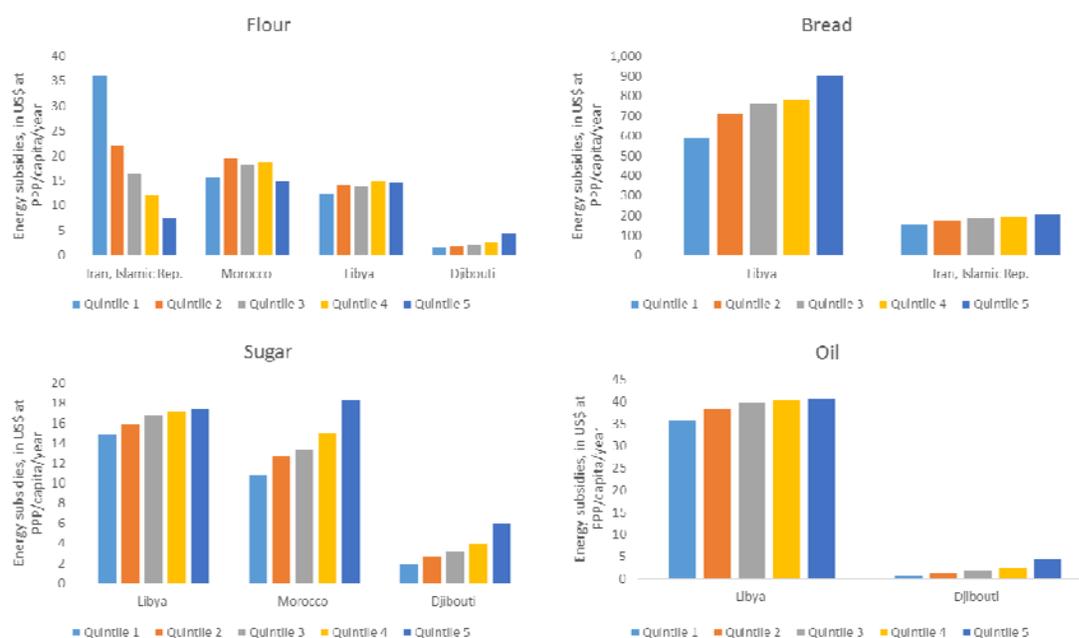
Figure 1: Distribution of Energy Subsidies, in US\$ at PPP/capita/year



Source: World Bank estimations from Household Budget Surveys.

The variety and amounts of food subsidies are much smaller than energy subsidies (Figure 2). They are below \$40-PPP for flour and oil and below \$20-PPP for sugar. The only significant subsidies are for bread in Libya and the Islamic Republic of Iran where the amounts can reach \$900-PPP and \$200-PPP, respectively, for the richest quintile, and the pattern is regressive. In general, larger subsidies accrue to richer quintiles with monotonic increases across quintiles. This pattern holds for sugar, bread, and oil for all countries and for flour in Libya and Djibouti, but not for Morocco and the Islamic Republic of Iran, where for flour subsidies are larger for poorer quintiles. Therefore, exceptions to the pro-richness of subsidies may exist also for food products.

Figure 2: Distribution of Food Subsidies, in US\$ at PPP/capita/year



Source: World Bank estimations from Household Budget Surveys.

### The Relative Importance and Distribution of Subsidies

Figure 3 illustrates the share of expenditure on total expenditure for the four energy products by country and by quintile. Starting with LPG, we see that Morocco and Tunisia have the highest shares of expenditure on LPG. These countries spend more in relative terms but less in absolute terms as shown in Figure 1. We can also see that these shares decrease as we move toward richer quintiles. The richest quintile in the Islamic Republic of Iran spends less than 0.1 percent of total expenditure on LPG. The shares in other countries are lower than 0.5 percent for all quintiles. With the only exception of Djibouti, the share of expenditure on LPG decreases with richer quintiles.

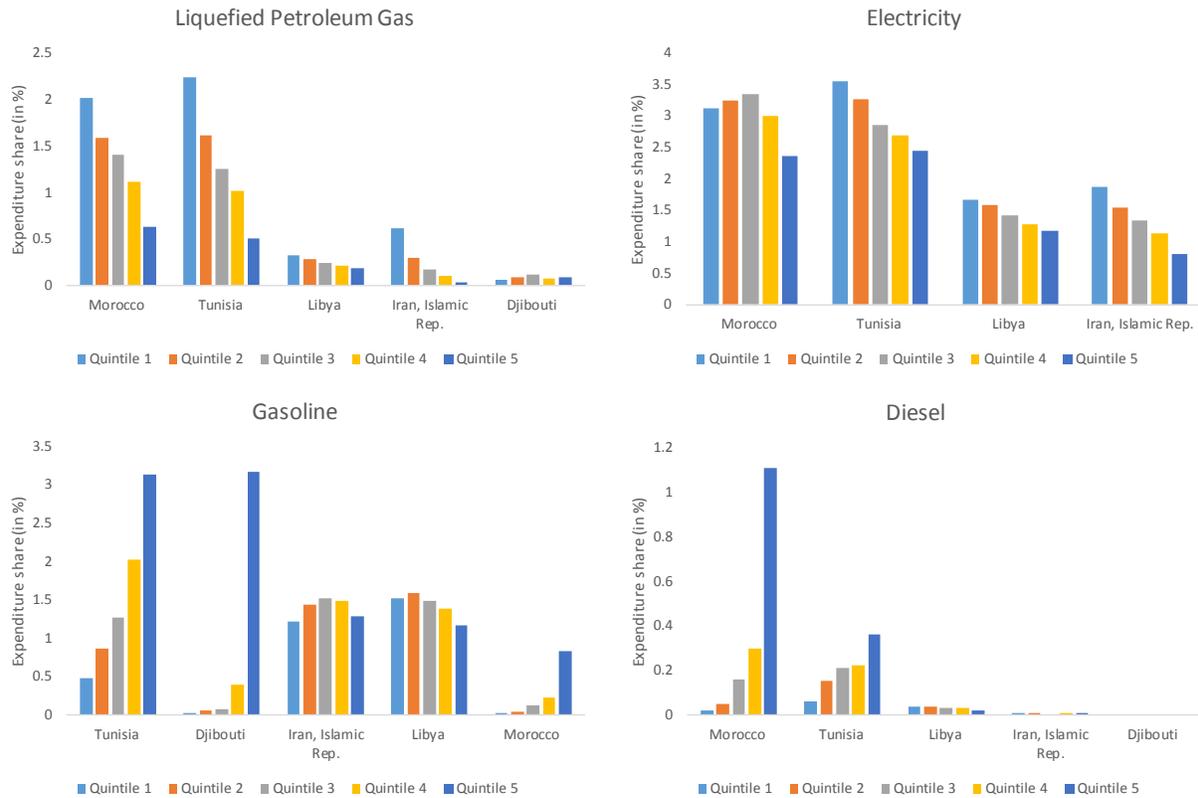
The situation is rather different for electricity. We can see that the share of expenditure in Morocco is the highest for the third quintile whereas it decreases from the poorest to the richest quintiles for all other countries. This result depends on the type of tariff system in place and on the coverage of electricity. The countries that show regular decreasing shares across the distribution tend to have almost universal coverage of electricity and mild progressive pricing, whereby higher blocks of consumption correspond to higher prices applied only to the marginal

quantities. In Morocco the hump-shaped distribution could be due to the particular combination of increasing block tariffs (IBT) and volume differentiated tariffs (VDT)<sup>1</sup> and the size of the interblocks price increases. For electricity, therefore, it would be wrong to assume that the share of household expenditure is invariably more important for the poor, particularly because the poor benefit from very low tariffs.

For gasoline and diesel the distributional picture is fairly consistent, but opposite to LPG. Gasoline and diesel are disproportionately consumed by richer households. In Morocco car ownership is concentrated among richer households, and the consumption of these products among poorer households is confined to small quantities used for motorcycles or nontransport purposes. We see the shares of household expenditure on gasoline and diesel growing with richer quintiles as shown in figure 1 for almost all countries. The exceptions for gasoline are Libya and the Islamic Republic of Iran, two oil-producing countries where subsidies are high, public transport is limited, and the use of private transport is almost universal. Indeed, we can see that the distribution in these two countries are hump-shaped, with the largest expenditure relative to total expenditure borne by the middle class.

The consumption of diesel is much smaller in all countries, and in Djibouti the Islamic Republic of Iran, and Libya is negligible. These are the countries where diesel cars are scarcely available or not permitted. In countries that do consume some amounts of diesel, the share of expenditure invariably grows with richer quintiles.

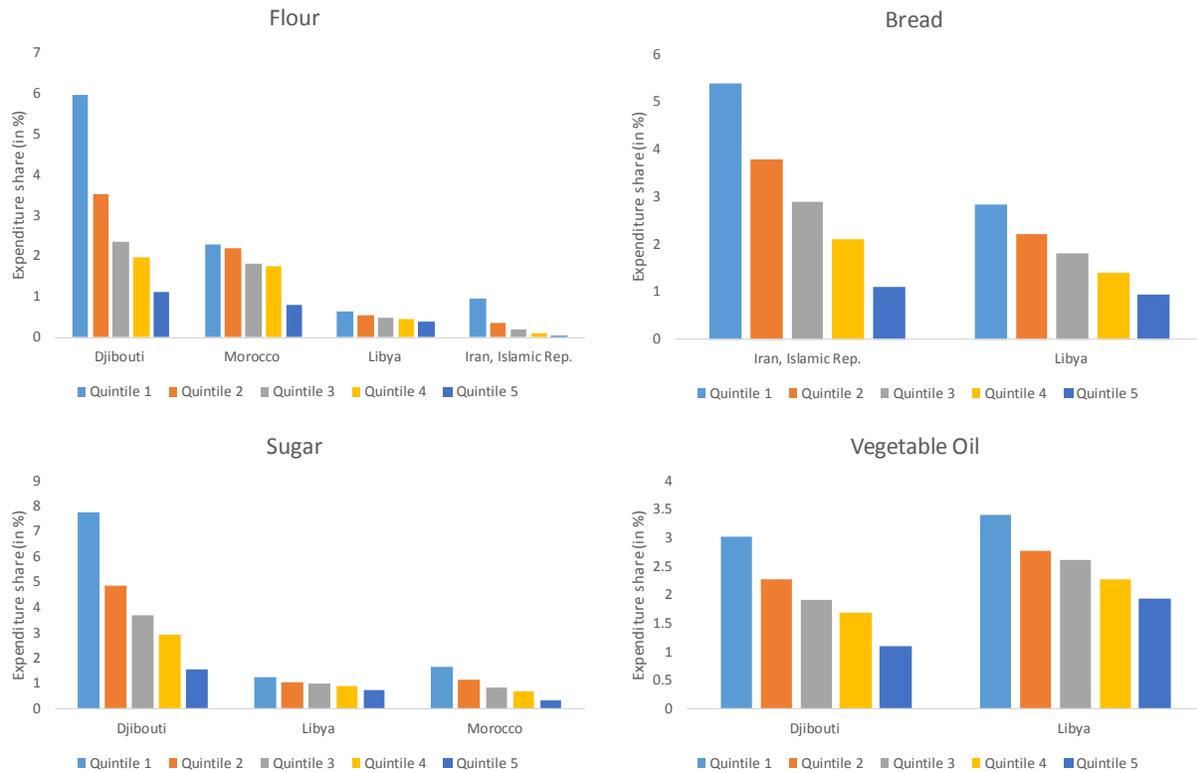
Figure 3: Expenditure Shares of Subsidized Energy Products across Countries and Quintiles



Source: World Bank estimations from Household Budget Surveys.

For food products (figure 4), the situation is much simpler. For all products and in all countries, the household budget shares of expenditure on subsidized products is higher for poorer households and progressively lower for richer households, as we should expect. The decrease between quintiles is also very steep in general, particularly for flour and sugar in Djibouti and bread in the Islamic Republic of Iran. These products are evidently very important for the poor in these countries, representing up to 8 percent of total expenditure for the poorest quintile.

Figure 4: Expenditure Shares of Subsidized Food Products across Countries and Quintiles



Source: World Bank estimations from Household Budget Surveys.

### A Policy Dilemma

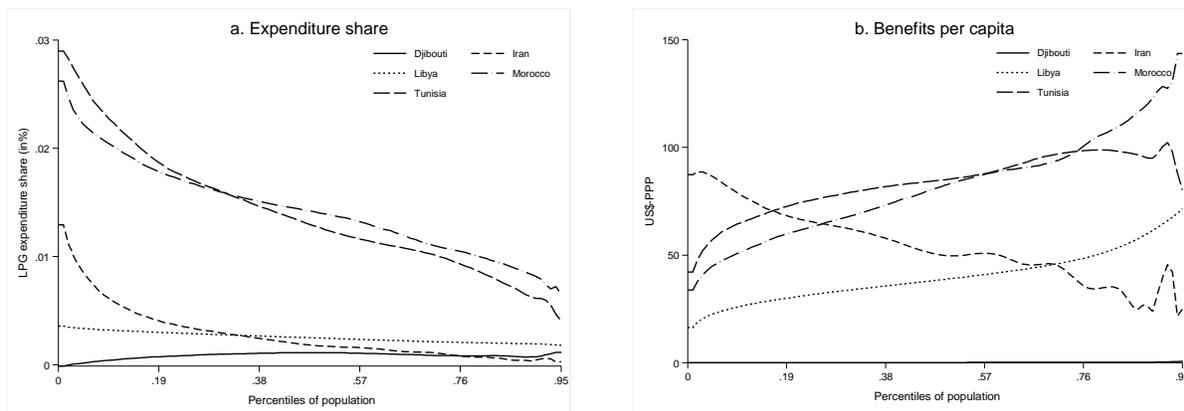
It should be clear by now that there is a certain trade-off between the share of expenditure on subsidized products in total household expenditure and the dollar amounts of subsidies received. To illustrate this trade-off, figure 5 plots these two dimensions across population percentiles for LPG in different countries. For most countries, the curves are negatively sloped for the expenditure shares, meaning that poorer households spend a larger share of total expenditure on subsidized products than richer households (figure 5, panel a). Also in most countries, richer households receive larger amounts of subsidies in per-capita terms (figure 5, panel b). This rule is not, however, always true. For example, the data for LPG in the Islamic Republic of Iran show a negative slope in both graphs, demonstrating not only that this product is more important for poorer households but also that these households receive a larger amount per capita in subsidies than richer households. This is less evident for food products, such as flour (figure 6). We can

see that although the share of expenditure is higher for poorer households as for energy products, the subsidies per capita are more pro-poor, particularly in the Islamic Republic of Iran. In Djibouti, however, subsidies on flour are pro-rich.

For most countries, this trade-off creates a dilemma. On the one hand, that subsidies are pro-rich would clearly speak in favor of eliminating subsidies with little consequences on welfare. On the other hand, these subsidized products can be relatively more important for the poor, even if subsidies are in place. The elimination of these subsidies would be felt more by the poor than by the rich with a likely effect on poverty. As we saw, the trade-off does not necessarily apply to all countries; instead, it varies across products, and the size of the trade-off may be different across products and countries.

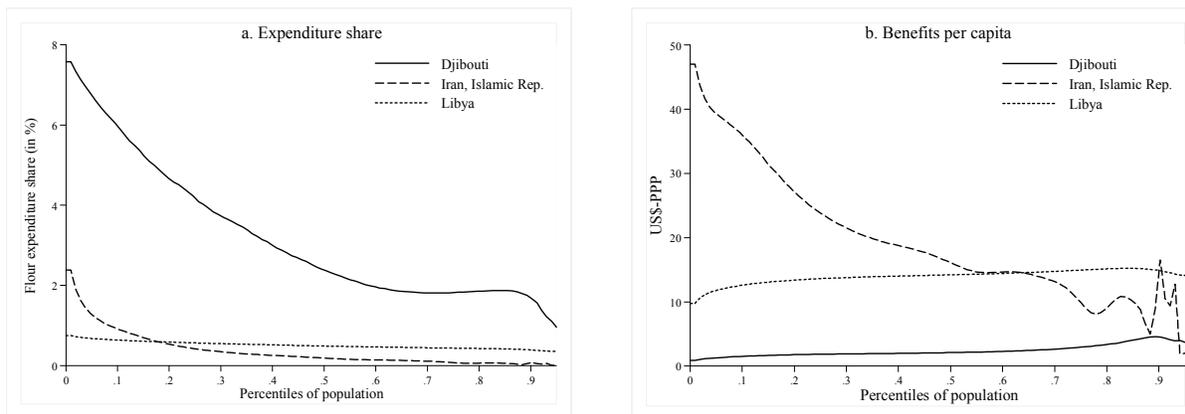
We should also note the structural relation between the values on the y-axes of the two panels in figure 5. Let  $p$  = unit free market price,  $s$  = unit subsidies,  $q$  = quantities, and  $y$  = total income. The y-axis of the panel a is then  $(pq-sq)/y$  and the y-axis of panel b is  $sq$ . Income and quantities being equal, the higher the unit subsidy, the lower the expenditure share. Subsidies and quantities being equal, the higher is income, the lower is the share of expenditure. Because the unit market price and subsidy are set by the government and equal for all, the shape of the lines largely depends on the distribution of incomes in each country. Therefore, knowledge of the household income or expenditure distribution is an essential prerequisite to prepare subsidy reforms.

Figure 5: Expenditure Shares of LPG versus Subsidies per Capita



Source: World Bank estimations from Household Budget Surveys.

Figure 6: Expenditure Shares of Flour versus Subsidies per Capita



Source: World Bank estimations from Household Budget Surveys.

## Simulations of Subsidy Reforms

In order to simulate comparable reforms across countries, we consider a flat reduction of unit subsidies by 30 percent across all products and all countries. We measure the impact of these reforms on household welfare, inequality, and the government budget in this order. We also consider the cost for the government of compensating the population to reach the pre-reform level of welfare. The implied changes in prices of the proposed simulations are large for most countries and products, which makes the standard linear approach to subsidies simulations inappropriate. We therefore model the demand function using Cobb-Douglas preferences.<sup>2</sup>

## Welfare

Figures 7 and 8 show the impact on household welfare (measured in terms of household expenditure per capita). For each product in the figures we have two panels. The top panel illustrates the welfare impact in annual per capita US\$, PPP terms. The bottom panel illustrates the welfare impact in terms of share of total household expenditure. Therefore, the top part of the figures is the absolute welfare effect, and the bottom part is the relative welfare effect.

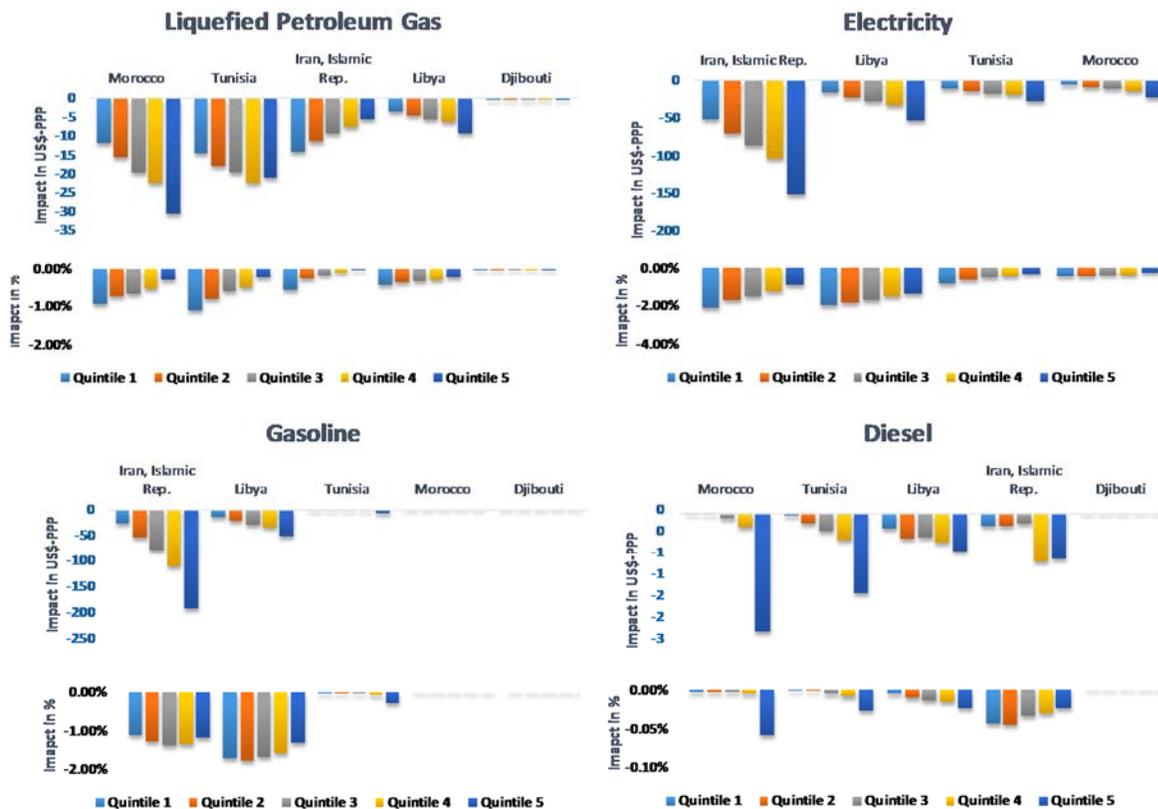
For LPG, the greatest impact of this reform would be in Morocco, with a per capita impact per year of about \$20-PPP on average. The smallest impact is in Djibouti, the poorest of the countries considered. It is also instructive to see that the distributions of these impacts can be

regressive or progressive depending on the country. In the Islamic Republic of Iran, the impact is regressive all along the distribution, with the highest per capita impact for the poorest quintile and the lowest impact for the richest quintile whereas they are progressive in all other countries. As these are dollar values, it is evident that the relative impact on household welfare is much greater for the poor than for the rich, as can be seen in the bottom part of the LPG figure, where it is clear that the welfare impact in terms of share of total expenditure is regressive in all countries.

For electricity, the welfare impact is quite large in all countries, with the Islamic Republic of Iran having by far the highest impact followed by Libya. In the Islamic Republic of Iran, the impact on the richest quintile is very high, about \$150-PPP per person, per year. But because the richest quintiles are affected the most in absolute terms, this impact is progressive in all countries. This result is due to the tariff systems in place, which typically include low tariffs for the first or the first two tariffs' blocks and high tariffs for the last block. As the relation between electricity consumption and household welfare is quite linear in most countries, households in the richer quintiles are also the largest consumers of electricity. This finding is apparent in the difference between the bars for the fourth and fifth quintiles. As for LPG, the welfare impact is progressive in absolute terms, but regressive in relative terms (relatively to total expenditure). As shown in the lower part of the electricity figure, in all countries, the relative welfare impact is regressive.

Welfare impacts are also high for gasoline, especially for the oil-producing countries of Libya and the Islamic Republic of Iran. The average cost for households in the richest quintile in the Islamic Republic of Iran is about \$200-PPP, a large amount even for a country that is the richest among those considered. For all countries, the welfare impacts are progressive because the poor do not own means of transport and therefore do not consume gasoline. The impacts on household welfare of diesel's reforms are very small as compared to the impact of other products. They are around \$1-PPP per person, per year. Also for diesel, the impact is progressive in all countries considered. Contrary to LPG and electricity, the relative welfare impact is not necessarily regressive but mostly progressive or hump-shaped.

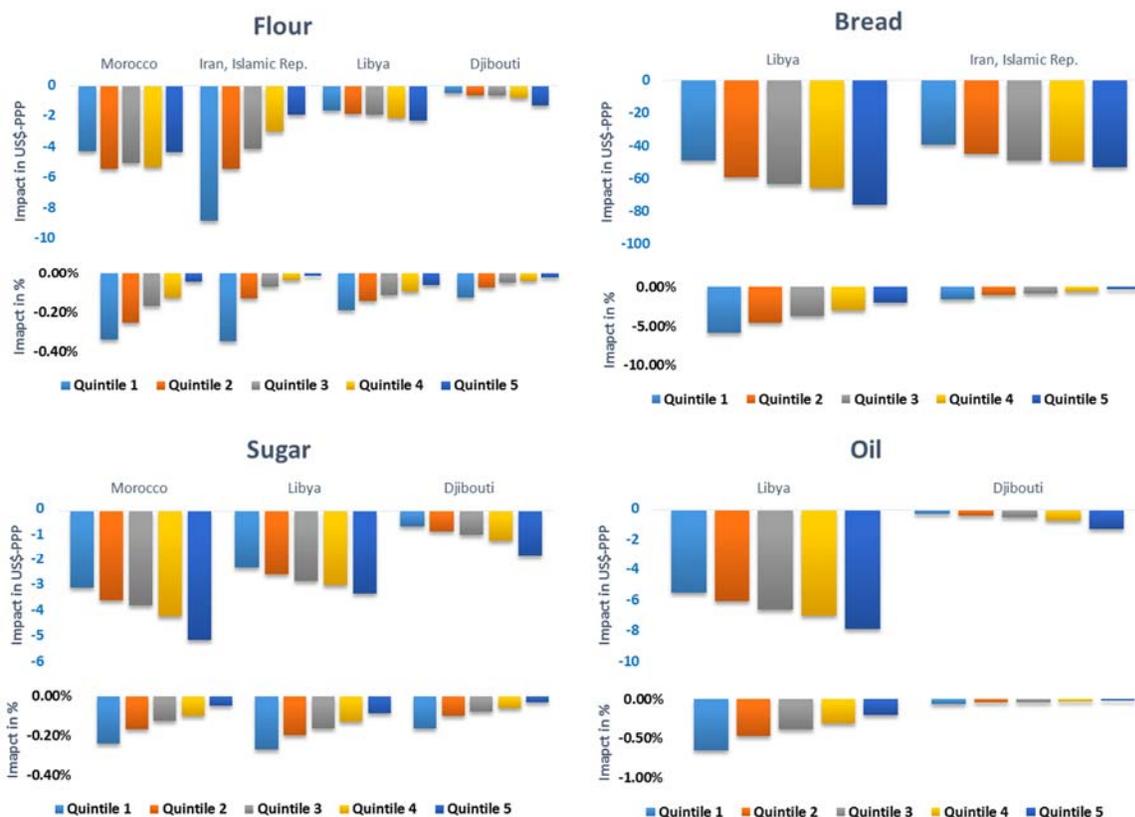
Figure 7 Welfare Impact of a 30 Percent Reduction in Energy Subsidies, in US\$-PPP/capita/ye



Source: World Bank estimations from Household Budget Surveys.

Figure 8 shows the welfare impact for food items. The relative welfare impact is unambiguously regressive for all products and countries. The absolute welfare impact can be progressive or regressive for flour, but is always progressive for bread, sugar, and oil. The largest impacts are observed for bread in Libya with close to \$80-PPP per person, per year for the richest quintile.

Figure 8: Welfare Impact of a 30 Percent Reduction in Food Subsidies, US\$-PPP/capita/year



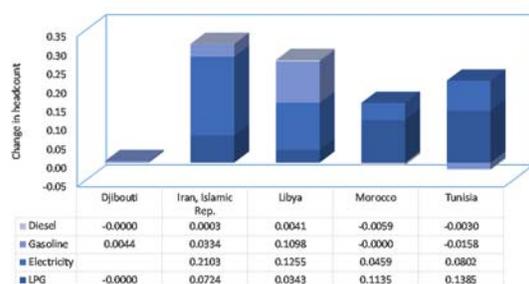
Source: World Bank estimations from Household Budget Surveys.

### Inequality

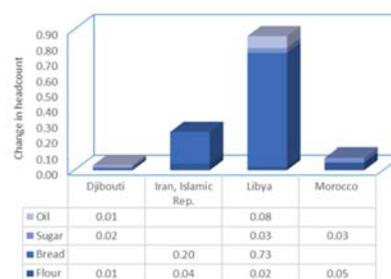
A reduction in subsidies implies a loss in welfare, but changes in inequality (measured in terms of changes of household expenditure per capita) can go in any direction depending on the distribution of expenditure and on the parts of the population that are most affected by the reforms. As is apparent in figure 9, the reduction in subsidies for energy products does not make much difference for inequality in any of the countries considered, with a maximum impact observed in the Islamic Republic of Iran for only one-third of one percentage point. These changes can also be positive or negative depending on the country, although it is clear that the changes are too small to be significant. The greatest increase in inequality is obtained in Libya if oil, sugar, bread, and flour subsidies are cut by 30 percent, but even in this extreme case, inequality would increase by less than one percentage point.

Figure 9: Inequality Impacts of a 30 Percent Reduction in Subsidies

a. Energy items



b. Food items



Source: World Bank estimations from Household Budget Surveys.

## Government Budget

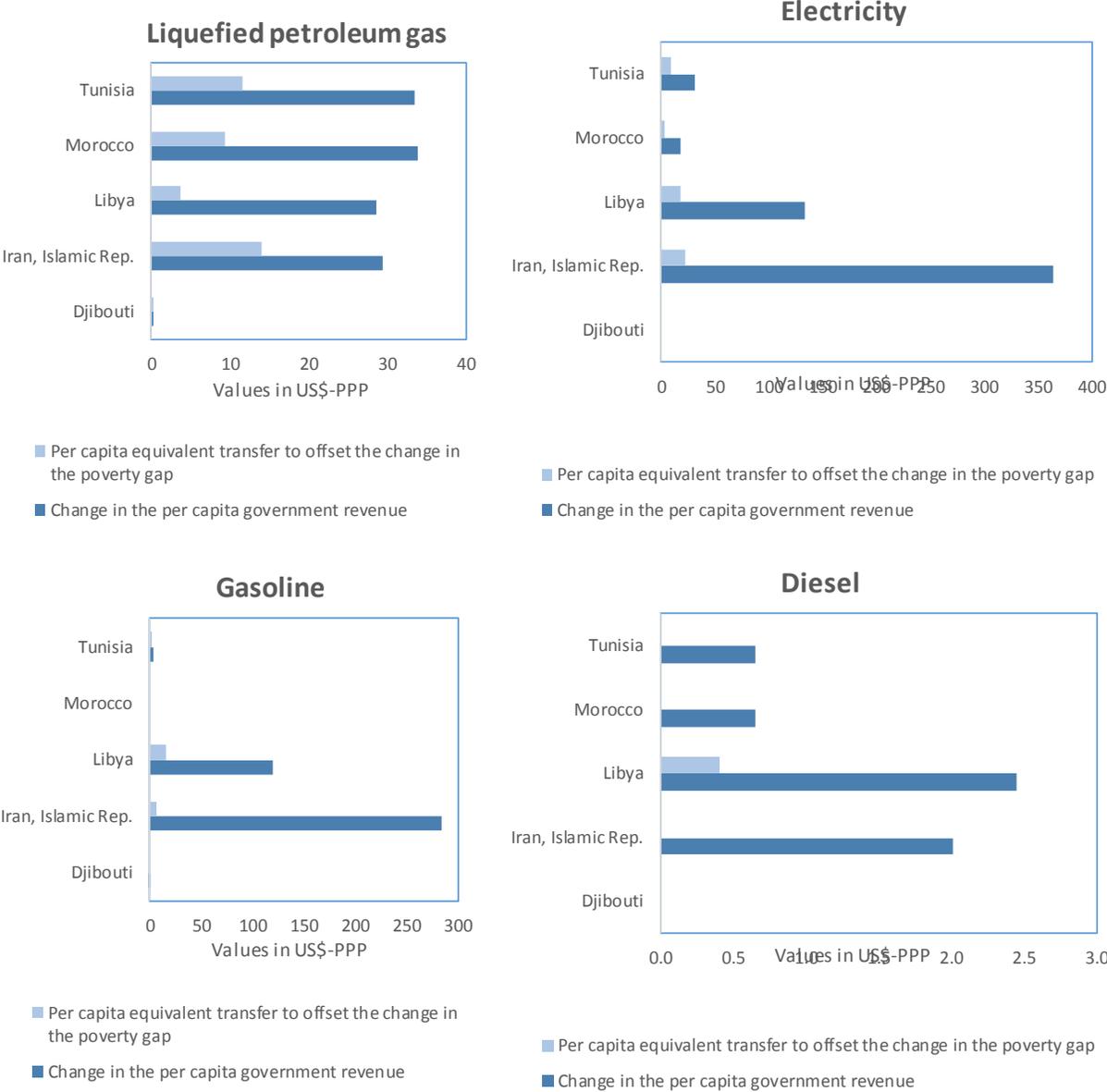
What are the gains in budget revenues? How much is required in cash transfers to offset the increase in the poverty gap determined by the reform? Figure 10 shows the increase in per-capita government revenue of a 30 percent reduction in subsidies. The graph also shows the necessary universal transfer required to offset the change in poverty gap resulting from the reforms. This amount can be considered as the minimum universal transfer necessary to keep the poverty gap unchanged.

Government revenues are always much larger than the universal cost of compensation to bring the poverty gap back to its pre-reform level. It is also possible to target compensation and reduce further the cost to the budget, but governments that implemented large reforms in recent years, such as the Islamic Republic of Iran, have not followed that route. On the other hand, governments may want to compensate some of the non-poor, particularly the middle-class, to reduce the risk of political backlash in the aftermath of the reforms. This may rise substantially the cost of compensation but Figure 10 shows that the space for maneuver to compensate beyond the poverty gap is quite large. Therefore, unless compensation benefits are extremely large and universal, reforming subsidies with compensation is most likely to reduce the overall cost of subsidies substantially.

For food items, in general, we observe that the impact is relatively low for the countries with limited subsidy programs, as is the case for Djibouti and Morocco. The picture is different for

Libya, where the food subsidy program is very large. In this country and with a universal transfer designed to offset the poverty gap, the increase in per capita government revenue can be large but still below the overall gains in revenues determined by the reforms.

Figure 10: Governments' Revenue Impact of a 30 Percent Reduction in Subsidies on Energy Products, in US\$-PPP/capita/year



Source: World Bank estimations from Household Budget Surveys.

## Conclusion

This paper has provided a comparative analysis of the distribution of subsidies across the MENA region and a comparative analysis of the welfare and budget effects of subsidy reforms considering a 30 percent reduction in subsidies. We used a special version of SUBSIM designed to make comparative analyses of subsidy reforms across countries in US\$-PPP values. The purpose of the paper was not to provide exact estimates of the impacts of reforms but to compare outcomes across countries.

The population sample considered is large, almost 130 million people or 34 percent of the total population in the MENA region in 2014. All data were actualized to 2014, and all expenditures transformed into US\$-PPP values using the latest 2011 PPP conversion factor. The total household expenditure considered is approximately \$0.63 trillion-PPP or 3,913 US\$-PPP per capita, per year on average. The sample of countries covered includes low-income countries, low-middle-income countries and middle-income countries. The sample also includes net oil exporters as well as net oil importers.

We found that the size of subsidies does not necessarily relate to the needs of a population. In Djibouti, for example, the poorest of the countries considered in this paper, the price of LPG is 15 times the price in the Islamic Republic of Iran, the richest country considered. Products such as LPG and electricity tend to have higher subsidies than gasoline. Food subsidies tend to be higher among net oil exporters, as the oil wealth is partly distributed to the population via food subsidies.

Subsidized products are quite important for the populations of the MENA region. LPG can account for more than 2 percent of total expenditure as for the poorest quintile in Tunisia, and electricity can reach 3.5 percent of expenditure as for the poorest quintile in Tunisia. And products such as sugar can reach up to 8 percent for the poorest people in Djibouti. The importance of LPG decreases with welfare, but it increases for gasoline.

The consumption pattern of subsidized products partly explains who benefits from subsidies, and it is clear that the main beneficiaries can be very different depending on the product and country considered. For example, in the Islamic Republic of Iran, subsidies are progressive for LPG but

regressive in all other countries, and electricity and gasoline subsidies are invariably regressive in that the majority of benefits in absolute terms accrue to richer households.

Comparing results on the importance of subsidized products and on the distribution of subsidies leads to an important policy dilemma. Subsidies may be very important for poor households, even though richer households receive the greatest share, which makes subsidy reforms complex from the perspective of public policies. A useful instrument to take decisions on subsidies is to compare the expenditure share curves by percentile of the expenditure distribution with the total subsidies per capita curves. Products and countries where both curves are positively sloped are the most promising for reforms because both the share of these products on household expenditure and the amount of subsidies are larger for the richer households.

Simulations of a 30 percent reduction in subsidies for all products showed that the welfare implications are important particularly for electricity and LPG where these reforms can reduce household welfare for the poorest quintiles by up to 2 percent for individual products and can reach 4 to 5 percent if we aggregate the impact for all products. Nevertheless, the impact on the poverty gap is small and the impact on inequality is negligible. Instead, the benefits to government budgets are quite large, even if countries decide to compensate households with a universal transfer that would offset the increase in the poverty gap. This result would suggest that countries have some fiscal space for compensating citizens beyond the poor.

## Annex 2A

Table A.1a: Expenditure Shares in Energy Products (percent)

	Djibouti	Iran, Islamic Rep.	Libya	Morocco	Tunisia
<b>LPG</b>					
Quintile 1	0.06	0.62	0.32	2.02	2.23
Quintile 2	0.09	0.3	0.28	1.58	1.61
Quintile 3	0.12	0.18	0.24	1.41	1.25
Quintile 4	0.08	0.1	0.21	1.12	1.02
Quintile 5	0.09	0.04	0.18	0.63	0.5
<b>Population</b>	<b>0.09</b>	<b>0.14</b>	<b>0.22</b>	<b>1.02</b>	<b>0.98</b>
<b>Electricity</b>					
Quintile 1	n.a.	1.86	1.66	3.11	3.55
Quintile 2	n.a.	1.53	1.58	3.25	3.27
Quintile 3	n.a.	1.33	1.42	3.34	2.85
Quintile 4	n.a.	1.13	1.28	2.99	2.68
Quintile 5	n.a.	0.8	1.17	2.35	2.44
<b>Population</b>	n.a.	<b>1.11</b>	<b>1.33</b>	<b>2.76</b>	<b>2.73</b>
<b>Gasoline</b>					
Quintile 1	0.03	1.22	1.52	0.01	0.47
Quintile 2	0.05	1.43	1.58	0.04	0.86
Quintile 3	0.08	1.52	1.49	0.12	1.27
Quintile 4	0.4	1.49	1.38	0.23	2.02
Quintile 5	3.16	1.28	1.16	0.83	3.13
<b>Population</b>	<b>1.87</b>	<b>1.37</b>	<b>1.35</b>	<b>0.48</b>	<b>2.14</b>
<b>Diesel</b>					
Quintile 1	0	0.01	0.04	0.02	0.06
Quintile 2	0	0.01	0.04	0.05	0.15
Quintile 3	0	0	0.03	0.16	0.21
Quintile 4	0	0.01	0.03	0.3	0.22
Quintile 5	0	0.01	0.02	1.11	0.36
<b>Population</b>	<b>0</b>	<b>0.01</b>	<b>0.03</b>	<b>0.64</b>	<b>0.26</b>

Source: World Bank estimations from Household Budget Surveys.

Table A.1b: Expenditure Shares in Food (percent)

	Djibouti	Iran, Islamic Rep.	Libya	Morocco
<b>Flour</b>				
Quintile 1	5.95	0.95	0.63	2.29
Quintile 2	3.53	0.35	0.55	2.19
Quintile 3	2.35	0.19	0.48	1.81
Quintile 4	1.96	0.10	0.45	1.74
Quintile 5	1.12	0.03	0.37	0.79
<b>Population</b>	<b>1.81</b>	<b>0.17</b>	<b>0.45</b>	<b>1.36</b>
<b>Bread</b>	n.a.			
Quintile 1	n.a.	5.4	2.85	n.a.
Quintile 2	n.a.	3.8	2.22	n.a.
Quintile 3	n.a.	2.9	1.80	n.a.
Quintile 4	n.a.	2.1	1.40	n.a.
Quintile 5	n.a.	1.1	0.94	n.a.
<b>Population</b>	n.a.	<b>2.2</b>	<b>1.52</b>	n.a.
<b>Sugar</b>				
Quintile 1	7.77	n.a.	1.23	1.68
Quintile 2	4.86	n.a.	1.05	1.16
Quintile 3	3.68	n.a.	0.99	0.86
Quintile 4	2.90	n.a.	0.88	0.67
Quintile 5	1.56	n.a.	0.76	0.34
<b>Population</b>	<b>2.58</b>	n.a.	<b>0.90</b>	<b>0.64</b>
<b>Oil</b>				
Quintile 1	3.02	n.a.	3.39	n.a.
Quintile 2	2.28	n.a.	2.76	n.a.
Quintile 3	1.91	n.a.	2.60	n.a.
Quintile 4	1.68	n.a.	2.28	n.a.
Quintile 5	1.10	n.a.	1.93	n.a.
<b>Population</b>	<b>1.48</b>	n.a.	<b>2.35</b>	n.a.

Source: World Bank estimations from Household Budget Surveys.

Table A.2a: Per Capita Subsidies in Energy Products, in US\$-PPP

	Djibouti	Iran, Islamic Rep.	Libya	Morocco	Tunisia
<b>LPG</b>					
<i>Quintile 1</i>	66.5	185.1	116	23.3	52.1
<i>Quintile 2</i>	83.2	149.6	169.1	39.1	66.5
<i>Quintile 3</i>	96.9	122	200.5	52.9	76.8
<i>Quintile 4</i>	115.6	99.7	240.7	67.6	91.1
<i>Quintile 5</i>	165.6	73.2	377.5	100.3	125.5
<b>Population</b>	<b>105.6</b>	<b>125.9</b>	<b>220.8</b>	<b>56.6</b>	<b>82.4</b>
<b>Electricity</b>					
<i>Quintile 1</i>	n.a.	334.15	108.3	20.78	50
<i>Quintile 2</i>	n.a.	449.1	157.91	34.95	63.91
<i>Quintile 3</i>	n.a.	542.06	187.3	47.25	73.78
<i>Quintile 4</i>	n.a.	656.06	224.79	60.35	87.49
<i>Quintile 5</i>	n.a.	946.57	352.57	89.58	120.56
<b>Population</b>	n.a.	<b>585.56</b>	<b>206.17</b>	<b>50.58</b>	<b>79.14</b>
<b>Gasoline</b>					
<i>Quintile 1</i>	0	244.63	97.34	0	0.66
<i>Quintile 2</i>	-0.01	469.19	155.11	0	2.07
<i>Quintile 3</i>	-0.02	693.17	192.81	0	4.23
<i>Quintile 4</i>	-0.16	963.85	238.34	0	9.45
<i>Quintile 5</i>	-3.65	1 685.58	343.1	0	27.76
<b>Population</b>	<b>-0.77</b>	<b>811.22</b>	<b>205.33</b>	<b>0</b>	<b>8.83</b>
<b>Diesel</b>					
<i>Quintile 1</i>	n.a.	0.28	0.31	0.25	0.8
<i>Quintile 2</i>	n.a.	0.32	0.5	1.03	3.48
<i>Quintile 3</i>	n.a.	0.24	0.47	4.67	6.6
<i>Quintile 4</i>	n.a.	1.19	0.58	12.97	9.94
<i>Quintile 5</i>	n.a.	1.11	0.76	114.33	30.43
<b>Population</b>	n.a.	0.63	0.52	26.64	10.25

Source: World Bank estimations from Household Budget Surveys.

Table A.2b: Per Capita Subsidies on Food, in US\$-PPP

	<b>Djibouti</b>	<b>Iran, Islamic Rep.</b>	<b>Libya</b>	<b>Morocco</b>
<b>Flour</b>				
Quintile 1	1.5	36.0	12.3	15.5
Quintile 2	2.0	21.9	14.1	19.5
Quintile 3	2.0	16.5	13.9	18.0
Quintile 4	2.7	12.1	14.9	18.6
Quintile 5	4.3	7.6	14.8	14.9
<b>Population</b>	<b>2.5</b>	<b>18.8</b>	<b>14.0</b>	<b>17.3</b>
<b>Bread</b>				
Quintile 1	n.a.	152.7	594.9	n.a.
Quintile 2	n.a.	175.6	709.3	n.a.
Quintile 3	n.a.	190.9	760.4	n.a.
Quintile 4	n.a.	193.1	786.3	n.a.
Quintile 5	n.a.	205.7	903.1	n.a.
<b>Population</b>	<b>n.a.</b>	<b>183.6</b>	<b>750.8</b>	<b>n.a.</b>
<b>Sugar</b>				
Quintile 1	1.99	n.a.	14.9	10.9
Quintile 2	2.69	n.a.	15.9	12.7
Quintile 3	3.16	n.a.	16.8	13.4
Quintile 4	3.96	n.a.	17.1	15.0
Quintile 5	6.04	n.a.	17.3	18.2
<b>Population</b>	<b>3.57</b>	<b>n.a.</b>	<b>16.4</b>	<b>14.0</b>
<b>Oil</b>				
Quintile 1	0.77	n.a.	35.7	n.a.
Quintile 2	1.26	n.a.	38.4	n.a.
Quintile 3	1.64	n.a.	39.7	n.a.
Quintile 4	2.30	n.a.	40.3	n.a.
Quintile 5	4.26	n.a.	40.7	n.a.
<b>Population</b>	<b>2.05</b>	<b>n.a.</b>	<b>39.0</b>	<b>n.a.</b>

*Source:* World Bank estimations from Household Budget Surveys.

Table A.3a: Impact on Welfare of 30 Percent Reductions in Subsidies on Energy Products, in US\$-PPP/capita

	Djibouti	Iran, Islamic Rep.	Libya	Morocco	Tunisia
<b>LPG</b>					
<i>Quintile 1</i>	0	-14.1	-3.6	-11.8	-14.5
<i>Quintile 2</i>	0	-11.5	-4.7	-15.5	-18
<i>Quintile 3</i>	0	-9.4	-5.5	-19.5	-19.6
<i>Quintile 4</i>	0	-7.7	-6.5	-22.2	-22.3
<i>Quintile 5</i>	-0.1	-5.6	-9.3	-30.5	-20.9
<b>Population</b>	<b>-0.1</b>	<b>-9.7</b>	<b>-5.9</b>	<b>-19.9</b>	<b>-19.1</b>
<b>Electricity</b>					
<i>Quintile 1</i>	n.a.	-52.6	-16.3	-5.3	-10.9
<i>Quintile 2</i>	n.a.	-71.2	-23.9	-8.7	-14.6
<i>Quintile 3</i>	n.a.	-86	-28.4	-11.8	-17.1
<i>Quintile 4</i>	n.a.	-104.1	-34.2	-15.1	-20.3
<i>Quintile 5</i>	n.a.	-151.1	-53.7	-22.9	-27.6
<b>Population</b>	n.a.	<b>-93</b>	<b>-31.3</b>	<b>-12.8</b>	<b>-18.1</b>
<b>Gasoline</b>					
<i>Quintile 1</i>	0	-27.7	-14.3	0	-0.2
<i>Quintile 2</i>	0	-53.3	-22.8	0	-0.6
<i>Quintile 3</i>	0	-78.9	-28.4	0	-1.2
<i>Quintile 4</i>	0	-109.8	-35.2	0	-2.7
<i>Quintile 5</i>	1.1	-192.8	-50.7	0	-7.9
<b>Population</b>	<b>0.2</b>	<b>-92.5</b>	<b>-30.3</b>	<b>0</b>	<b>-2.5</b>
<b>Diesel</b>					
<i>Quintile 1</i>	n.a.	-0.27	-0.35	-0.01	-0.05
<i>Quintile 2</i>	n.a.	-0.29	-0.57	-0.02	-0.21
<i>Quintile 3</i>	n.a.	-0.22	-0.54	-0.11	-0.4
<i>Quintile 4</i>	n.a.	-1.12	-0.67	-0.31	-0.61
<i>Quintile 5</i>	n.a.	-1.06	-0.87	-2.74	-1.86
<b>Population</b>	n.a.	<b>-0.59</b>	<b>-0.6</b>	<b>-0.64</b>	<b>-0.63</b>

Source: World Bank estimations from Household Budget Surveys.

Table A.3b: Impact on Welfare of 30 Percent Reductions in Subsidies on Food Products, in US\$-PPP/capita

	Djibouti	Iran, Islamic Rep.	Libya	Morocco
<b>Flour</b>				
<i>Quintile 1</i>	-0.5	-8.8	-1.6	-4.2
<i>Quintile 2</i>	-0.6	-5.4	-1.8	-5.4
<i>Quintile 3</i>	-0.6	-4.0	-1.9	-5.0
<i>Quintile 4</i>	-0.8	-3.0	-2.1	-5.2
<i>Quintile 5</i>	-1.3	-1.9	-2.3	-4.3
<b>Population</b>	<b>-0.7</b>	<b>-4.6</b>	<b>-1.9</b>	<b>-4.8</b>
<b>Bread</b>				
<i>Quintile 1</i>	n.a.	-39.0	-49.0	n.a.
<i>Quintile 2</i>	n.a.	-45.1	-59.0	n.a.
<i>Quintile 3</i>	n.a.	-49.1	-63.6	n.a.
<i>Quintile 4</i>	n.a.	-49.7	-66.1	n.a.
<i>Quintile 5</i>	n.a.	-53.1	-76.4	n.a.
<b>Population</b>	n.a.	<b>-47.2</b>	<b>-62.8</b>	n.a.
<b>Sugar</b>				
<i>Quintile 1</i>	-0.6	n.a.	-2.3	-3.0
<i>Quintile 2</i>	-0.8	n.a.	-2.5	-3.5
<i>Quintile 3</i>	-0.9	n.a.	-2.8	-3.7
<i>Quintile 4</i>	-1.2	n.a.	-2.9	-4.2
<i>Quintile 5</i>	-1.8	n.a.	-3.3	-5.1
<b>Population</b>	<b>-1.1</b>	n.a.	<b>-2.7</b>	<b>-3.9</b>
<b>Oil</b>				
<i>Quintile 1</i>	-0.2	n.a.	-5.5	n.a.
<i>Quintile 2</i>	-0.4	n.a.	-6.0	n.a.
<i>Quintile 3</i>	-0.5	n.a.	-6.6	n.a.
<i>Quintile 4</i>	-0.7	n.a.	-7.0	n.a.
<i>Quintile 5</i>	-1.3	n.a.	-7.8	n.a.
<b>Population</b>	<b>-0.6</b>	n.a.	<b>-6.6</b>	n.a.

Source: World Bank estimations from Household Budget Surveys.

## Annex B

Table B.1: International Monetary Fund Macrodata

Country	Subject Descriptor	Units	Scale	2006	2007	2008	2009	2010	2011	2012	2013	2014
Djibouti	GDP per capita constant prices	National currency	Units	108169.33	110567.48	113800.2	116269.69	117047.07	118946.39	121307.84	123904.68	127752.04
	Inflation end of period consumer prices	Index		116.765	126.303	137.985	140.974	144.918	155.96	159.9	161.7	165.4
	Population	Persons	Millions	0.753	0.774	0.796	0.818	0.841	0.865	0.889	0.914	0.939
Iran, Islamic Rep.	GDP per capita constant prices	National currency	Units	25 057 735.74	26360340	26426030	26651480	27983292	28773649	26584071	25743492	25787180
	Inflation end of period consumer prices	Index		48	58.8	69.2	76.5	91.6	110.4	155.885	186.579	223.894
	Population	Persons	Millions	70.496	71.278	72.18	73.201	74.339	75.15	76	76.978	77.969
Libya	GDP per capita constant prices	National currency	Units	7358.255	7696.338	7774.212	7599.614	7864.235	3037.559	6120.156	5464.247	4963.839
	Inflation end of period consumer prices	Index		106.629	114.713	125.871	126.284	130.483	165.252	159.18	161.894	174.012
	Population	Persons	Millions	5.686	5.782	5.877	5.964	6.053	5.943	6.032	6.122	6.213
Morocco	GDP per capita constant prices	National currency	Units	17680.617	17961.779	18760.908	19443.461	19938.567	20714.095	21053.161	21787.614	22416.684
	Inflation end of period consumer prices	Index		101.6	103.618	108	106.3	108.6	109.6	112.446	112.869	115.691
	Population	Persons	Millions	30.506	30.841	31.177	31.514	31.851	32.187	32.522	32.853	33.179
Tunisia	GDP per capita constant prices	National currency	Units	4367.983	4597.276	4756.819	4852.745	4943.176	4789.873	4914.562	4982.483	5066.098
	Inflation end of period consumer prices	Index		105.331	110.73	115.182	119.882	124.691	129.876	137.603	145.923	153.713
	Population	Persons	Millions	10.128	10.225	10.329	10.44	10.547	10.674	10.778	10.918	11.06

Source: IMF World Economic Outlook database April 2014.

Table B.2: Macrodatab, Prices, and Subsidies in Local Currency (2014)

Country	Year	Macrodatab			US\$-PPP <sup>b</sup>	Price and subsidies in local currencies					
		Inflation	Population growth	GDP		LPG (13 kg)		Gasoline (1 liter)		Diesel (1 liter)	
						Price	Subsidy	Price	Subsidy	Price	Subsidy
Djibouti	2012	3.40%	5.60%	5.30%	<b>104.104</b>	2,948.4	294.8	315	-6.3	215	26.875
Iran, Islamic Rep.	2013	20.00%	1.30%	0.20%	<b>8,565,406</b>	16,643	83,214.8	4,000	20,000	3,500	19,500
Libya	2008	38.20%	5.70%	-36.10%	<b>0.691</b>	2	18.9	0.15	1.072	0.15	1.11
Morocco	2007	7.10%	6.40%	19.50%	<b>4.178</b>	43.3	86.5	12.8	0	9.89	0.8
Tunisia	2010	23.30%	4.90%	2.50%	<b>0.753</b>	7.4	15.7	1.856	0.186	1.584	0.334

*Sources:*

- a. IMF World Economic Outlook Database, April 2014, and *WDI*.
- b. Updated to 2013 by the World Bank.

## Notes

The authors are grateful to Shanta Devarajan, Mustapha Nabli and Vivien foster for useful comments on previous versions of the paper. All remaining errors are responsibility of the authors.

1. IBT = increasing block tariffs, which means that consumers pay the marginal price on marginal quantities, for example, \$0.10 on the first 100 kWh of electricity consumed, \$0.15 cents on the consumption between 101 and 200 kWh, and so forth. VDT = volume differentiated tariffs, which means that consumers pay the marginal price on all quantities consumed, for example, \$0.10 if they consume less or equal to 100 kWh of electricity consumed, \$0.15 on all quantities consumed if they fall in the consumption block 101–200, and so forth.
2. See [www.subsim.org](http://www.subsim.org) for more details on the SUBSIM model and its use.

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